

Wake up, the pitchforks are coming for us

Study on the effect of state minimum wage policies on income inequality in the U.S. from 1970 to 2016.

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Abstract

Income inequality, as one of the acutest social problems in the U.S., has attracted many researchers' attention in the last ten years. While most analyses focusing on the macro factors effect towards the income inequality such as education inequality, economy growth, globalization and immigration, few research has sought feasible means for governments to effectively reduce it. A potential tool suggested by the institutional economists recently is the minimum wage policy, which is against the classical economics model. This paper uses the database at the state level in the U.S. from 1970 to 2016 to test whether minimum wage policies can help to reduce the income inequality. Estimated by a fixed panel model with interaction effect considered at 10-year interval, the results support the hypothesis and conclude that the effect state minimum wage depends with the educational attainment, economic growth rate and level of globalization.

1 Introduction

In 1980s, the top 5% people of the U.S. shared 16.5% of the national income, while the bottom 40% shared 14.4%. 35 years later, the top 5% people shares nearly 22% of the national income, while the bottom 40% shares around 11% (the U.S. Census Bureau). The long-last income concentration towards the very tippy top has put the income inequality into the center of social researchers' attention (e.g. Fields, 1984; Duro and Esteban, 1998; Jaumotte et al., 2008; Palma, 2011; Picot and Hou, 2014). Based on those previous studies, most sociologists have come to a consensus that the income inequality, at least within the OECD countries, is driven mainly by education inequality, economy growth, globalization and immigration.

Recently however, some economists realized that the minimum wage policy can also be a feasible and effective tool for reducing poverty and income inequality (Volscho, 2005). Despite the potential negative unemployment effect of the minimum wage based on the neoclassical economics hypothesis, raising the minimum wage will not significantly lower family income inequality (Atkinson et al., 2005). One universally accepted explanation is that the imperfect competitions and uneven information distribution exist in almost everywhere, including the labour markets. Therefore, it is an enormous potential role for government to correct such labour market failures (Stiglitz, 2012, p.35-64).

In fact, more and more economists agree the favor of the institutional economists that the minimum wage policy can help to redistribute the social income(e.g. Coase, 1937; Dow, 1997; Couch and Levin-Waldman, 2002; Kaufman, 2010). In his paper "Institutional Economics and the Minimum Wage: Broadening the Theoretical and Policy Debate", Kaufman argued that increasing the minimum wage will offset imperfect competition and inequality of bargaining power under some plausible conditions, thus improving the economics efficiency in the end.

Acted as a measurement for social stratification, income inequality in the U.S. has approached the social threshold (McLeod, 2013). Therefore, this paper focused on estimating the effect of the U.S. minimum wage policies at the state level on the distribution of after-tax income inequality in the U.S. from 1970 to 2016, and tried to see whether and by how much the minimum wage policies adjustment would be really beneficial for the income redistribution.

2 Neoclassical and Institutional Theories

According to the Neoclassical economics, any proposed minimum wage policy would set a price floor in the labor market and thus generate market inefficiency (Stigler, 1946).

Assuming the market is in perfect competition, the Neoclassical economics theory implies that laborers should be paid at their marginal productivity. Therefore, a wage floor would cause some of those labours whose marginal productivity less than the minimum wage being discharged, while some of those with relatively higher marginal productivity above being overpaid.

As a result, the minimum wage policy would benefit some intermediate-skilled workers since they do not lose their job and get paid higher than their productivity, but hurts the low-skilled workers by pricing them out of the labor market since the employers do not value their labor at the new wage. What's

worse, the high-skilled workers with marginal productivity higher than the minimum wage should not be influenced, and still get paid at their marginal productivity. That is to say, in theory, what the minimum wage policy really does is transferring the income from the extremely low-skilled workers to the relatively low-skilled workers. It does not help the income redistribution at all.

Institutional economists, however, disagree with this point of view. The wage floor will generate market inefficiency and hurts the low-skilled workers, but only under the assumption that the market is in perfect competition, but which is not that plausible in most situations (e.g. Greenwald, 1986; Reardon, 1997; Caspi et al., 1998; Munshi, 2003; Stiglitz, 2012).

Two essential conditions of the perfectly competitive market assumption is the perfect information and no transaction cost, which are violated given the essence of the employment relationship (Prasch, 2004).

First, given the companies with more alternative resources and options if an agreement does not achieved, the employers have aggressively more information including the candidates' personal information and the company's internal information, while the workers, especially those low-skilled, less educated or disadvantaged gender and ethnic groups, would suffer the inequality of bargaining power (Kaufman, 2010). What's more, in practice, workers do not even know their own "marginal productivity", hence Pricing their own labour unit would be harder than the theory, which amplifies the negative aspect of incomplete information to the workers.

Second, the zero transaction cost assumption implies that any multi-person companies should be disintegrated into many single-person cooperates (e.g. Coase, 1937; Dow, 1997). Appropriately, since single-person units do not need employees, labor markets will not exist in theory (e.g. Kaufman, 2007b, 2008). Thus, by contradiction, institutional economists claim that there must be positive transaction cost as long as the labor markets exist.

In fact, the values of workers, especially for low-skilled workers, can only be realized within an organization in most circumstance (Marx, 1867). Without relying the capitals and labor division stricture in a company, a single person can almost impossible to fulfill his "marginal productivity". Hence, an tight employment relationship is necessary for modern workers. Further, with the development of technology and division of Human Society, the reliance becomes heavier and deeper, thus the transaction cost for employees is not only non-zero, but also non-negligible.

Consequently, given the incomplete information and non-zero transaction cost, some compromise

such as being paid less than their marginal productivity has to be made by the workers, which Smith (1776) named as "the award for investment", Marx (1867) described as "the exploitation of capitalism", while institutional economists Veblen and Chase (1934) called as "the power of institution". But whatever this name of this phenomenon is, the labor markets are not perfectly efficient in most circumstance. The implication is that the invisible hand cannot fully protect the conditions of labor, hence the government regulations must be introduced to ensure efficiency and equity, as well as correct the failures of the market (Stiglitz, 2012).

Besides, some policy makers holding the Neoclassical economics ideas may be worried that while the extra wage floor is transferred into increasing unemployment, the new labor cost is increasing the marginal cost of products (Stigler, 1946). The increasing marginal cost of production will shift the supply curve to the right and result in an increase in the prices in the goods markets. The increased prices could reduce the demand for goods, which means there is less demand for the labor to produce those goods as well. In the end, the economy will slip into a recession equilibrium in which prices and unemployment rate are unnecessarily high. Thus, as Coase (1940) states, "Legal minimum wages, except in rare cases of extreme exploitation, are inimical to the interests of workers and society at large." (p. 100).

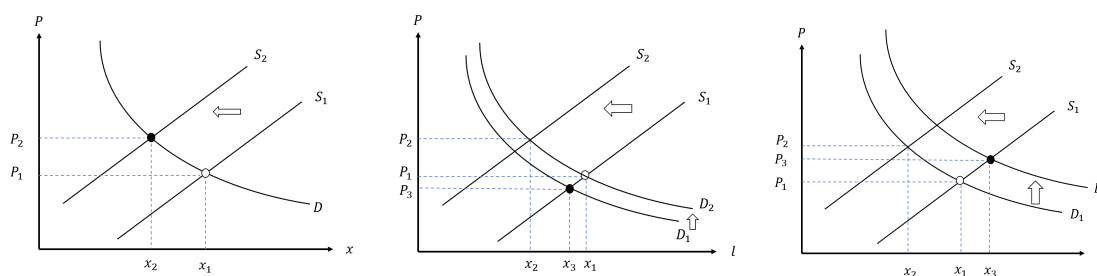


Figure 1: Potential Results by Neoclassical and Institutional Economics and in Goods Markets of Increasing Minimum Wage

The left one is the potential result in goods markets for extreme minimum wage policy opponents. The middle one is the potential result in goods markets for mild minimum wage policy opponents. The right one is the potential result in goods markets for minimum wage policy supporters.

However, even under the Neoclassical economics perfect market assumption, the result of setting a wage floor is ambiguous. Given some low-skilled workers lose their jobs, some intermediate-skilled workers get overpaid. Hence, they have more income to consume in the goods market, which will shift up the demand for products by those companies. In general, the Neoclassical economics theory expects

that the products of firms in new equilibrium will decrease, but not as much as the statement above.

Nevertheless, the institutional economists are still not satisfied with the mild minimum wage policy opponents' explanation. According to Veblen and Chase (1934), the economy should be viewed as a dynamic ecosystem. A proper increase in the minimum wage would allow the demand in the goods markets increases such that the demand for labor gets to increase as well. And the increased labor demand would in return result in a new increase in the wage. Need to note that in this case, not only the minimum wage increased, the wages for other income distribution quantiles also increased, thus in the end helped the social wealth redistribution. That is, instead of moving to an equilibrium, the institutional economists argued that a virtuous circle can be formed in an economy if markets were well-managed.

In a word, the Neoclassical model states that under perfect market assumption, any imposed minimum wage policy not only causes market inefficiency but also aggravates income inequality instead of reducing it, with similar results ought to be obtained under imperfect market. Institutional economics theory, on the other hand, agrees the first part of negative effect of minimum wage polices with perfect market, but not with the second (Kaufman, 2010).

Therefore, based on the institutional economics theory, I will test the hypothesis that the minimum wage policies can help to stabilize the inequality, with the alternative hypothesis that the minimum wages can help to reduce the income inequality under the Neoclassical economics theory.

3 Data, Controls

The demographic and economics data used in this paper relied on a wide variety of primary sources.

The response variable in this paper was measured as the Gini coefficient index from 1970 to 2016. The Gini index for 1970-2000 were provided by the Census Bureau's summary table "[Table S4. Gini Ratios by State: 1969, 1979, 1989, 1999](#)", while the Gini index for 2000-2016 were estimated by the Census Bureau's American Community Survey "[ACS 1-year Estimates Detailed Tables](#)". Here, the Gini index for 1970, 1980, 1990 and 2000 were estimated by the Gini index for 1969, 1979, 1989, and 1999 due to the database limitation.

Gini index is a widely used gauge of for income distribution. Via plotting Lorenze Curve with the population percentile by income on the horizontal axis and cumulative income on the vertical axis, the

index is defined as the percentage of the area bounded by the 45 degree perfect equality line (0.5 by definition) and the Lorenze Curve over the area under the perfect equality line. In other words, the Gini coefficient measurement, ranging between 0 and 1, is positively related with the income inequality. For example, if every resident has the same income, and 1 if one resident earned all the income, while everyone else earned nothing (Chappelow, 2020).

The database for the minimum wage policies at state level came from the Bureau of Labor Statistics, reports from state and local agencies, and postings on state labor departments' websites, assembled by Vaghul and Zipperer (2016). In order to reflect the real income level for these minimum wage receivers, the minimum wage is adjusted via dividing the nominal minimum wage by the CPI for each year.

Further, to test the hypothesis that the minimum wage policies will help to redistribute the family income, this paper controlled multiple variables that have been found to be significant to the income inequality in the previous studies.

In line with Gregorio and Lee (2002), the education inequality was measured as the dispersion of educational attainment in the population. Here, the educational attainment was estimated as the percentage of people not completing high school at the state level for each year, provided by [United State Economics Research Services](#). The relation between educational attainment and Gini index was shown to be nonlinear and consistent in Figure 2. Intuitively, when everyone gets the opportunity to finish their high school, the uneducated% should not influence the family income inequality; when everyone does not get the opportunity to finish their high school, the uneducated% would also not influence family income inequality. Based on the rough scatter plot and intuitive analysis above, this paper used a quadratic term to estimate the effect of the educational inequality on income inequality in the U.S..

Even though a high rate of economics growth is neither necessary nor sufficient for inequality to decline, greater inequality has historically been related to the distribution of social wealth (Vaghul and Zipperer, 2016). In fact, the trickle-down economics view that the more rapid the rate of economics growth, the more rapid the improvement in employment and income distribution is valid under the assumption that the markets are efficient. However, as we mentioned before, the markets failed in most conditions. Therefore, the economy growth rate should still be considered. Given the database of GDP in unit of million from [Bereau of economics Analysis](#), this paper estimated the economy growth as the growth rate.

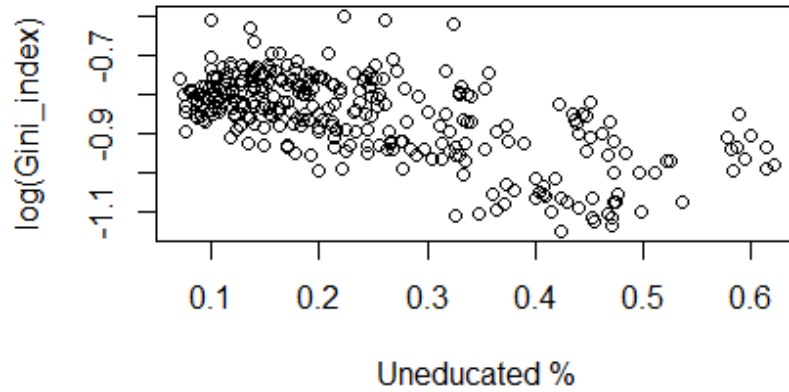


Figure 2: Scatter Plot with Gini Index and Uneducated level

Another key factors associated with the rising global inequality was the uprising trend of globalization for recent years (e.g. Alderson and Nielsen, 2002; Jaumotte et al., 2008). Following the general consensus in sociology, the globalization was measured by KOF Index, collected via ETH Zurich University's [KOF Swiss Economics Institute](#). Since the globalization would affect the U.S. as a whole and state-level related data were unavailable, this paper used only the country-level KOF index. And specifically, this paper used *KOFecGldf*, the KOF in terms of economics globalisation, to estimate the globalization effect toward the Gini index.

The KOF Index of Globalisation is an index of the degree of globalisation of 122 countries conceived by Dreher (2006) at the Konjunkturforschungsstelle of ETH Zurich, in Switzerland. By weighted summing the economics globalization, social globalization and political globalization index, the KOF index is bounded between 0 and 100. The higher the KOF index is, the deeper the globalization of an economy would be.

Some argue that immigration affects income inequality by increasing the supply of low-wage labor (Picot and Hou, 2014), However, Moore and Pacey (2003) who analyzed the proportion of immigration in Canada from 1980 to 1996, found that the overall impact of immigration is a relatively short-run phenomenon as recent low-wage immigrants take time to adjust to the labour market. And once recent immigrants are excluded, the income inequality is still rising, but at a slower rate. Therefore, in a dynamic and inclusive economy such as Canada and the U.S., the immigration effect should be insignif-

icant to income inequality in the long run. For this paper, since the data was considered in the unit of 10-year intervals, the immigration effect was not included in the analysis.

4 Methodology

Following the mainstream model in this field (e.g. Fields, 1984; Duro and Esteban, 1998; Jaumotte et al., 2008; Palma, 2011; Picot and Hou, 2014), this paper considered the effect of the state minimum wage with a panel model as

$$\ln(G_{it}) = \beta_0 + \beta_1 MW_{it} + \beta \cdot X_{it} + \gamma_i + \epsilon_{it}$$

where G_{it} is the Gini income inequality index for state i at time t , MW_{it} is the real minimum wage for state i at time t and X_{it} represents a series of control variables for state i at time t and ϵ_{it} is the error term.

Different from Volscho (2005) who analyzed the problem with independently pooled model, this paper assumed that there exists a unique unobserved time-invariant variable γ_i as a institutional or historical factor for each state. Following the political structure of the U.S., we know a state is a constituent political entity, bound together in a political union. Therefore, it is more convincing to estimate the panel model under either fixed effect assumption and random effect assumption.

The key assumption of fixed effect panel model is that there are unique variables γ_i which do not vary across time for each individual i . These attributes may or may not be correlated with the individual dependent variables. As opposed to the random effect panel model, the key assumption is that there exist unique time-invariant attributes γ_i , such that γ_i are not correlated with the individual regressors.

The difference between fixed effect model and random effect model is, when γ_i are really not correlated with the individual regressors, both models are consistent but the random effect model is more efficient than the fixed effect model; when γ_i are correlated with the individual regressors, fixed effect model is still consistent but the random effect model is not. Due to this difference, a hypothesis test for the correlation between γ_i and regressors is required. In general, the Hausman test for model misspecification in a regression model would be considered.

Thence, the first step of this paper is to analyze the data under the random effect assumption.

Although the pooled OLS can be used to derive unbiased and consistent estimates of parameters even when time constant attributes are present, pooled OLS would not be considered because either fixed effect or random effects will be more efficient.

However, the random effect assumption may not hold. Therefore, the next step of this paper is to test whether the individual unobserved heterogeneity γ_i is uncorrelated with the independent variables or not via comparing the fixed effects panel model by the Hausman specification test.

Although we first estimate the panel model with no interaction effect, there is no reason to assume the variation in control variables would not influence the margin effect of the minimum wage toward income inequality. Therefore, this paper will also estimate the panel model with interaction effect considered as

$$\ln(G_{it}) = \beta_0 + \beta_1 MW_{it} + \alpha \cdot MW_{it} \mathbf{X}_{it} + \beta \cdot \mathbf{X}_{it} + \gamma_i + \epsilon_{it}$$

and then manually eliminates some insignificant variables from the full model based on the adjusted R^2 and economics analysis. Note that stepwise selection methods based on AIC, BIC or AICc is not considered due to the reason that the problems such as biased R-squared values and regression coefficients may get amplified when dealing the model with panel data (Sribney, 1996).

Finally, similarly to the previous steps, the Hausman specification test would be done to test whether the uncorrelated γ_i assumption holds by comparing the two new panel models under random effect assumption and fixed effect assumption.

5 Results and Analysis

The cleaned data set contains 308 observations, focusing on 1970, 1980, 1990, 2000, 2010, 2016, with the descriptive statistics and variable descriptions are reported in Table 1.

Variable Descriptions	Estimate (Std. error)
$\ln(G_{it})$	−0.856 (0.105)
MW	3.626 (0.781)
$Uneducated$	0.244 (0.134)
$\ln(GDP_Million)$	11.132 (1.451)
KOF	36.908 (12.145)

Note: the database are collected mainly from "[Table S4. Gini Ratios by State: 1969, 1979, 1989, 1999](#)", "[ACS 1-year Estimates Detailed Tables](#)", United State Economics Research Services, Bureau of economics Analysis, KOF Swiss Economics Institute and reports from state and local agencies, and postings on state labor departments' websites, assembled by Vaghul and Zipperer (2016).

Table 1: Summary Statistics

The results of the first linear panel models with both fixed and random effect assumptions are presented in Table 2. These models are the mainstream models not considering intersection effect between controls and the minimum wage levels.

	Random	(Std. error)	Fixed	(Std. error)
(Intercept)	-1.06798179***	(0.04600209)		
MW	-0.04868224***	(0.00451991)	-0.04230666***	(0.00442041)
Uneducated	0.31982080*	(0.12423006)	-0.28423836*	(0.13842171)
I(Uneducated ²)	-0.03426590	(0.14316210)	0.40125226**	(0.13720193)
growth_rate	0.17620624**	(0.05435927)	0.14603487**	(0.04921753)
KOFecGIdf	0.00818708***	(0.00062225)	0.00493510***	(0.00072628)
adj-R ²	0.87335		0.89604	
Hausman Test				< 2.22e-16

p < 0.1; *p < 0.05; **p < 0.01; ***p < 0.001 (two-tailed tests).

Table 2: Coefficients from PLM Models without Interactive Effect for the State Minimum Wage on Income Inequality(Gini Index), 1970 - 2016

Given the Hausman test result, we reject the null hypothesis " H_0 : Both models are consistent". Hence, considering the consistency of the fixed effect model higher than the random effect, we restrict our attention to the fixed effect model.

Consistent with the hypothesis, the fixed effect model suggested that the minimum wage policies did

help to reduce the income inequality. The estimate for the minimum wage was statistically different from 0 with p-value < 0.01 (two-tailed test). The coefficient -0.004 implies that for each \$1 increase in the state minimum wage, the expected change in the Gini index is around -0.04%. For example, given the Gini index of 41.5 CPI of 240 and the average nominal minimum wage of \$7.98 for the U.S. in 2016, we have

$$\Delta EG_{2026}\% = \frac{10.38 - 7.98}{2.4} \cdot (-0.04) = -0.04$$

if we increase the minimum wage to \$10.38. Therefore, we would expect the Gini index in 2026 to be around 41.48.

Other variables were significant as addressed in previous empirical analyses. Specifically, the Uneducated% coefficients were in the expected direction as well. It approximately revealed the quadratic relation with the Gini index, in a sense that both 100% and 0% uneducated level would not affect income inequality, but 50% uneducated level would maximize the partial effect of the educational attainment to income inequality.

However, one may notice that although the minimum wage policies does help to reduce the income inequality significantly according to the database, the effect of it is not ideal. Comparing with the potential risk of increasing unemployment rate and closed stores, the governments may focus on improving the growth rate or education attainment.

The results of the second linear panel models with both fixed and random effect assumptions are presented in Table 3. These models are the mainstream models considering intersection effect between controls and the minimum wage levels.

	Random	(Std. error)	Fixed	(Std. error)
(Intercept)	-0.53998429***	(0.12784272)		
MW	-0.18039122***	(0.03899329)	-0.13566991***	(0.03616802)
Uneducated	0.11362671	(0.16302706)	-0.26012512	(0.16374623)
I(Uneducated ²)	0.03654397	(0.25544229)	0.57895005*	(0.24376394)
growth_rate	-2.45989382***	(0.52312065)	-2.70498240***	(0.48495957)
KOFecGIdf	-0.00366163	(0.00246155)	-0.00421799	(0.00233410)
MW:Uneducated	0.04651637	(0.06770525)	-0.01726658	(0.06278390)
MW:growth_rate	0.58686464***	(0.09387510)	0.58976049***	(0.08631754)
MW:KOFecGIdf	0.00307686***	(0.00070499)	0.00236020***	(0.00065631)
growth_rate:KOFecGIdf	0.01026128	(0.00623506)	0.01678067**	(0.00588079)
adj- R^2	0.90926		0.92264	
Hausman Test				0.004177

p < 0.1; *p < 0.05; **p < 0.01; ***p < 0.001 (two-tailed tests).

Table 3: Coefficients from PLM Models with Interactive Effect for the State Minimum Wage on Income Inequality (Gini Index), 1970 - 2016

Again, the null hypothesis " H_0 : Both models are consistent" was rejected and the fixed effect model was selected. Meanwhile, consistent with the hypothesis, the fixed effect model suggested that the minimum wage policies did help to reduce the income inequality. But this time, the coefficients were a little bit different.

The coefficient of MW was -0.1336, with the coefficient of the real minimum wage interacting with Uneducated%, growth rate and globalization index were -0.017, 0.560 and 0.002 respectively. For example, given the Gini index of 41.5 and the average nominal minimum wage of \$7.98, CPI of 240, uneducated level of 14.0%, growth rate at 1.6% and KOFecGldf of 50.8 for the U.S. in 2016, we have

$$E(\Delta G_{2026}\%) = \frac{10.38 - 7.98}{2.4}(-0.136 - 0.017 \cdot 14\% + 0.560 \cdot 1.6\% + 0.002) \approx -0.127$$

if we increase the nominal minimum wage to \$10.38. Therefore, we would expect the Gini index in 2026 to be around 36.55.

Note that even though the estimate for the minimum wage, and the interaction with growth rate and globalization index were statistically different from 0 with p-value < 0.01 (two-tailed test), the interaction with educational attainment estimator is insignificant. But even if we substitute the null hypothesis " H_0 : $\beta_{Uneducated} = 0$ " into the calculation, we still have

$$E(\Delta G_{2026}\%) = \frac{10.38 - 7.98}{2.4}(-0.136 - 0 \cdot 14\% + 0.560 \cdot 1.6\% + 0.002) \approx -0.125$$

and thus expecting the Gini index in 2026 to be around 36.62.

The result was in the expected direction as well. According to Fields (1984), the high-speed economics growth tends to cause high income inequality if not well-managed. The benefit of the high-speed growth may only concentrate on a small group of the people but not the whole country. The economy in turn needs a longer time to adjust to the equilibrium if government does not enter to regulate.

For the educational attainment estimator, even though none of them were significantly different from 0 apart from the $I(\text{Uneducated}^2)$ factor, the sign of the coefficients did follow our institutional economics theory and intuition. According to the institutional economics perspective (e.g. Fields, 1984; Bluestone and Harrison, 2001; Couch and Levin-Waldman, 2002; Kaufman, 2010), the minimum wage policy is a mean for social income redistribution, which reflected in the results. Given the negative sign

of $MW \cdot Uneducated$, the higher the uneducated level an economy is, the more effective the minimum wage policy would be on average, with all other variables fixed. Meanwhile, the $Uneducated\%$ still formed a concave up quadratic relation, which fitted in our intuitional analysis above as well.

The suggestion of the fixed effect models with and without interaction effect were extremely different from each other. For the first fixed effect model without interaction effect considered, even though the minimum wage policy can help the income redistribution, the effect is not very large. Government may consider other methods to decrease the income inequality, such as fasting the economics growth rate. The second fixed effect model with interaction effect, instead, not only supported the hypothesis that minimum wage policy can help the income redistribution, but also suggested that government should consider the minimum wage policy as an effective mean to decrease the income inequality.

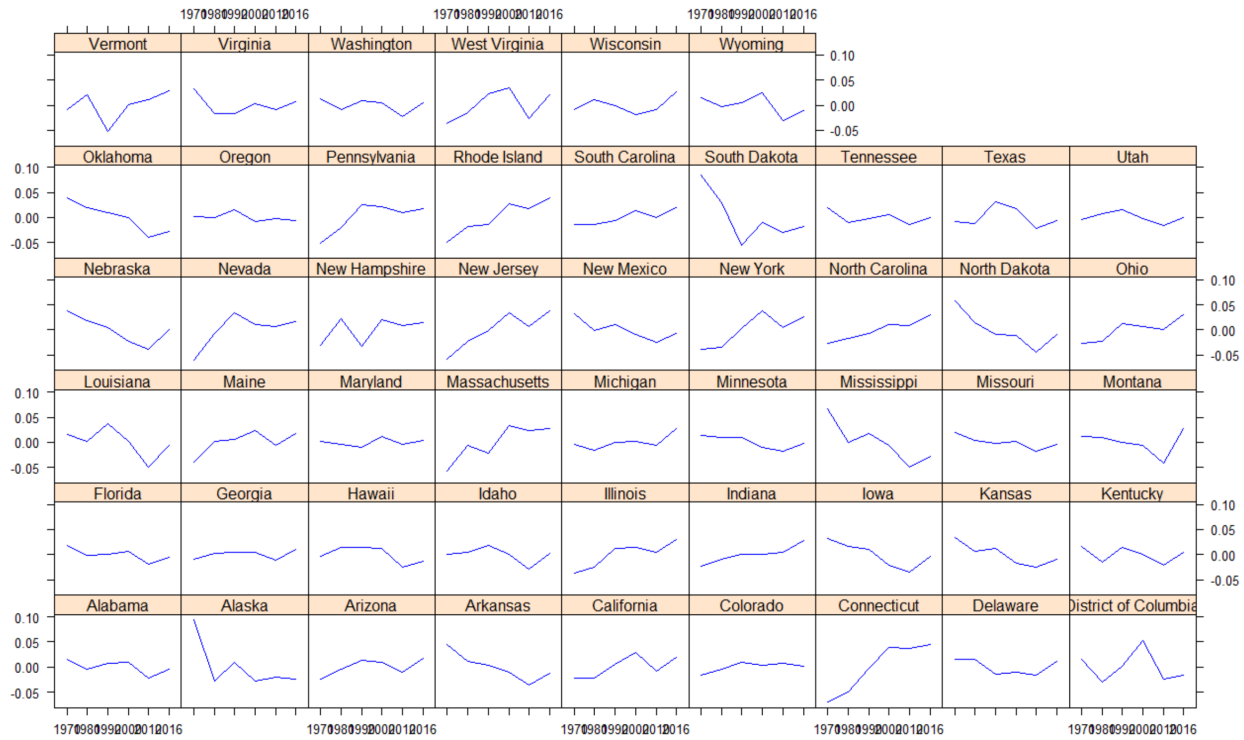


Figure 3: Residual plots of the Second Fixed Effect Model with Interaction Effect

Given the similar $adj-R^2$, I am not able to clarify which models were definitely better fitted in practice, which is the main shortage of this paper. However, based on those previous studies and economics analysis above, the interaction effect should not be ignored. Therefore, I will suggest the fixed model with interaction effect considered.

One may also concern the omitted variables bias. But since the income inequality is a complex

macroeconomics problem with lots of observed and unobserved factors interact with each other, no matter how many variables considered, the potential omitted variables bias always exists. Given the $\text{adj-}R^2$ be around 0.92264 with the consensual controls (e.g. Fields, 1984; Duro and Esteban, 1998; Jaumotte et al., 2008; Palma, 2011; Picot and Hou, 2014) included in the models, I would expect the omitted variables bias to be small at some relatively high confidence level.

Meanwhile, since the Gini index is a time series, one may also consider the Gini index has its own trend apart from the relation with variables in the panel model, in a sense that the historical data of the Gini index may help to predict the Gini index in the future. Yet, roughly by the residuals plots (Figure 3) of the second fixed effect panel model, this trend can not to find.

6 Conclusion and Limitation

Given the worldwide increasing income inequality in the U.S., this paper suggested a feasible and effective mean for the U.S. government by testing and supporting the hypothesis that the minimum wage policy helped income redistribution, at least in the U.S.. The relation between the minimum wage and income inequality can be viewed as non-linear with other factors such as education attainment, economy growth and globalization interacted. The state minimum wage is more effective on average at reducing inequality when the growth rate or globalization level is relatively low, and/or the undulation level is high, which is on the expect direction.

Meanwhile. this paper showed that the rise in income inequality can be accounted for by the decline in the purchasing power of the federal minimum wage over the 35 years (Figure 4). Thus on the other hand supports the institutional economics opinion that the minimum wage does redistribute income from the top quintile to the bottom.

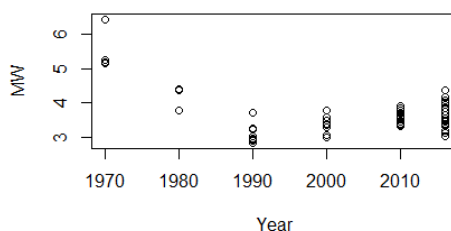


Figure 4: Change of Real Minimum Wage over time

Need to note that this fiscal policy would potentially generate increasing unemployment rate under different market conditions with different economic theories. And there are also some researchers such as Leigh (2008) pointing out that raising the minimum wage may not significantly help the poor and income redistribution, which is also revealed by my first fixed effect panel model without interaction effect. Hence, this paper have just pointed out a strategy the U.S. governments may consider to reduce inequality, but detailed analysis in multiple aspects including the political effects, psychological effects should be considered in the future.

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